

GEOPHYSICAL SURVEY REPORT G1673B

Land adjacent to
Wetherden Road,
Elmswell, Suffolk

Client:



On Behalf Of:



GSB
PROSPECTION Ltd

*Celebrating over 25 years
at the forefront of
Archaeological Geophysics*



GEOPHYSICAL SURVEY REPORT

Project name: Land adjacent to Wetherden Road Elmswell, Suffolk
Job ref: G1673B
Client: Pegasus Planning Group
Survey dates: 8 – 10 August 2016
Report date: 12 August 2016
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Version number and issue date: V1: 12 August 2016
V2: 7 September 2016

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TABLE OF CONTENTS

1	SUMMARY OF RESULTS	1
2	INTRODUCTION	1
3	METHODS, DATA PROCESSING & PRESENTATION	2
4	RESULTS	3
5	DATA APPRAISAL & CONFIDENCE ASSESSMENT	3
6	CONCLUSION	3
7	REFERENCES	4

LIST OF FIGURES

Figure 1	1:50 000	Site Location Diagram
Figure 2	1:2000	Location of Survey Areas
Figure 3	1:2000	Magnetometer Survey – Greyscale Plots
Figure 4	1:2000	Magnetometer Survey – Interpretation

APPENDICES

Appendix A	Technical Information: Magnetometer Survey Method
Appendix B	Technical Information: Magnetic Theory
Appendix C	Written Scheme of Investigation (GSB 2016)
Appendix D	OASIS Data Collection Form

DIGITAL CONTENT (CD)

- Minimally Processed Greyscale Images and XY Trace Plots in DWG format
- DWG Viewer
- Digital Copies of Report Text and Figures (both PDF and native formats)

1 SUMMARY OF RESULTS

No anomalies of archaeological interest were detected at Elmswell Site 2 (Phase 1) or Site 3.

2 INTRODUCTION

2.1 Background synopsis

GSB Prospection Ltd. was commissioned to undertake a geophysical survey of an area proposed for residential development. This survey forms part of an archaeological investigation being undertaken by **Pegasus Planning Group** on behalf of **Endurance Estates Strategic Land Ltd.**

2.2 Site Details

HER Parish Code	EWL 037
HER Event Number	ESF24389
OASIS ref. No.	Gsbprosp1-259004
NGR / Postcode	Site 2 (Phase 1): TL 996 633 / IP30 9DG Site 3: TL 995 631 / IP30 9DG
Location	The sites are located approximately 13km east of Bury St. Edmunds on the eastern edge of Elmswell. The northern parcel is bounded to the south by Wetherden Road, and to the west by residential properties on Jubilee Terrace and Laurel Court. Farmland lies to the north and east. The southern parcel is south of Wetherden Road, with houses on Mill Gardens to the west and farmland to the east and south.
HER/SMR	Suffolk CC
District	Mid Suffolk DC
Parish	Elmswell CP
Topography	Flat, with moderate slopes.
Current Land Use	Oil seed rape stubble
Soils	Ashley (572q) association fine loamy over clayey soils with slowly permeable subsoils and slight seasonal waterlogging, associated with similar but wetter soils. Some calcareous and non-calcareous slowly permeable clayey soils. In the south of Site 3, soils are Newport 3 (551f) association deep well drained sandy and coarse loamy soil: some coarse and fine loamy soils with slowly permeable subsoils and slight seasonal waterlogging. Risk of wind erosion (SSEW 1983).
Geology	Crag Group – sand with superficial deposits of Head - clay, silt, sand and gravel. Croxton sand and gravel in the south of Site 3 (BGS 2016).
Archaeology	No archaeological remains are known within the survey area (Pegasus 2016).
Survey Methods	Detailed magnetometer survey (fluxgate gradiometer).
Study Area	Site 2 (Phase 1) 2.6ha; Site 3: 9ha

2.3 Aims and objectives

To locate and characterise any anomalies of possible archaeological interest within the study area.

3 METHODS, PROCESSING & PRESENTATION

3.1 Standards & Guidance

This report and all fieldwork have been conducted in accordance with the latest guidance documents issued by Historic England (EH 2008) (then English Heritage) and the Chartered Institute for Archaeologists (IfA 2002 & ClfA 2014).

3.2 Survey methods

Detailed magnetic survey was chosen as an efficient and effective method of locating archaeological anomalies.

Technique	Instrument	Traverse Interval	Sample Interval
Magnetometer	Bartington Grad 601-2	1m	0.25m

More information regarding this technique is included in Appendix A

This project was carried out in accordance with a WSI (Appendix C) submitted to and agreed by Suffolk CC (GSB 2016).

3.3 Data Processing

The following schedule shows the basic processing carried out on the data used in this report:

1. *De-stripe*
2. *De-stagger*

3.4 Presentation of results and interpretation

The presentation of the data for each site involves a greyscale plot of processed data. Magnetic anomalies have been identified, interpreted and plotted onto the 'Interpretation' drawings. The minimally processed data are provided as a greyscale image on the CD together with an XY trace plot in CAD format. A CAD viewer is also provided.

When interpreting the results several factors are taken into consideration, including the nature of archaeological features being investigated and the local conditions at the site (geology, pedology, topography etc.). Anomalies are categorised by their potential origin. Where responses can be related to very specific known features documented in other sources, this is done (for example: Abbey Wall, Roman Road). For the generic categories levels of confidence are indicated, for example: probable, or possible archaeology. The former is used for a confident interpretation, based on anomaly definition and/or other corroborative data such as cropmarks. Poor anomaly definition, a lack of clear patterns to the responses and an absence of other supporting data reduces confidence, hence the classification "possible".

4 RESULTS

- 4.1 No responses of archaeological potential are visible in the magnetic data.
- 4.2 Two former old field boundaries have been detected. The first, in the northern parcel, is aligned east-west; the second, in the southern parcel, is aligned north-south. Both of these are depicted on the First Edition OS map. A third, tentative boundary shows as a weak narrow band of anomalies in the northern parcel. Although not marked on old mapping, the linear responses follow the same alignment as an existing boundary to the south.
- 4.3 There are several trends in the data which are just discernible when viewed at high resolution; they appear different to the ploughing trends (see below 4.5) but they could still be agricultural or modern in origin. An archaeological explanation is unlikely, therefore they are classified as uncertain – trend.
- 4.4 There are a few amorphous responses which are typical of localised variations in the soils or near-surface geology.
- 4.5 Feint, parallel trends in the data indicate modern plough lines.
- 4.6 A modern service, or perhaps a conduit, runs along the northern boundary of Site 3.
- 4.7 Ferrous responses around the field edges are due to fences, gates and nearby buildings. Smaller scale ferrous anomalies ("iron spikes") are present throughout the data, and their form is best illustrated in the XY trace plots. These responses are characteristic of small pieces of ferrous debris in the topsoil and are commonly assigned a modern origin. The most prominent of these are highlighted on the interpretation diagram.

5 DATA APPRAISAL & CONFIDENCE ASSESSMENT

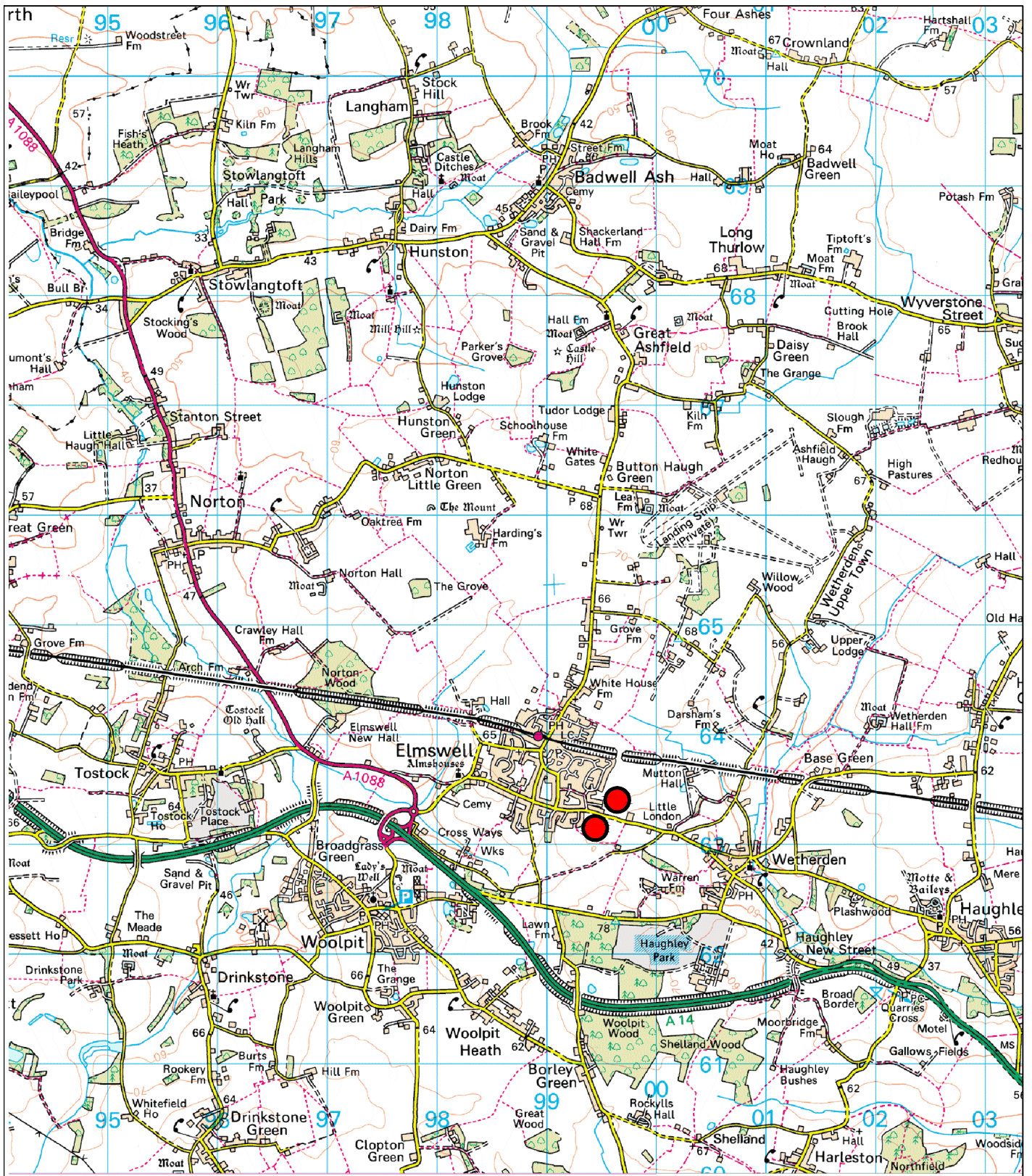
- 5.1 Historic England (then English Heritage) Guidelines (EH 2008) Table 4 states that the average response on sands and gravels is very variable. However, the presence of the old field boundaries and the ploughing anomalies suggests that the survey is likely to have detected any archaeological features, if present.

6 CONCLUSION

- 6.1 No anomalies of clear archaeological interest were detected.
- 6.2 Two or three old field boundaries are visible in the results, as are a few uncertain trends. These are not considered to be of any archaeological significance. A pipe or drain has been recorded in the southern parcel.

7 REFERENCES

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C. Gaffney, J. Gater and S. Ovenden. Institute for Archaeology, Reading
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Wales, Harpenden.



 Site Location



Title: Site Location Diagram

Client: Pegasus Planing Group

Project: G1673B
Land adjacent to
Wetherden Road, Elmswell,
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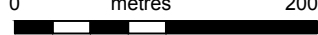
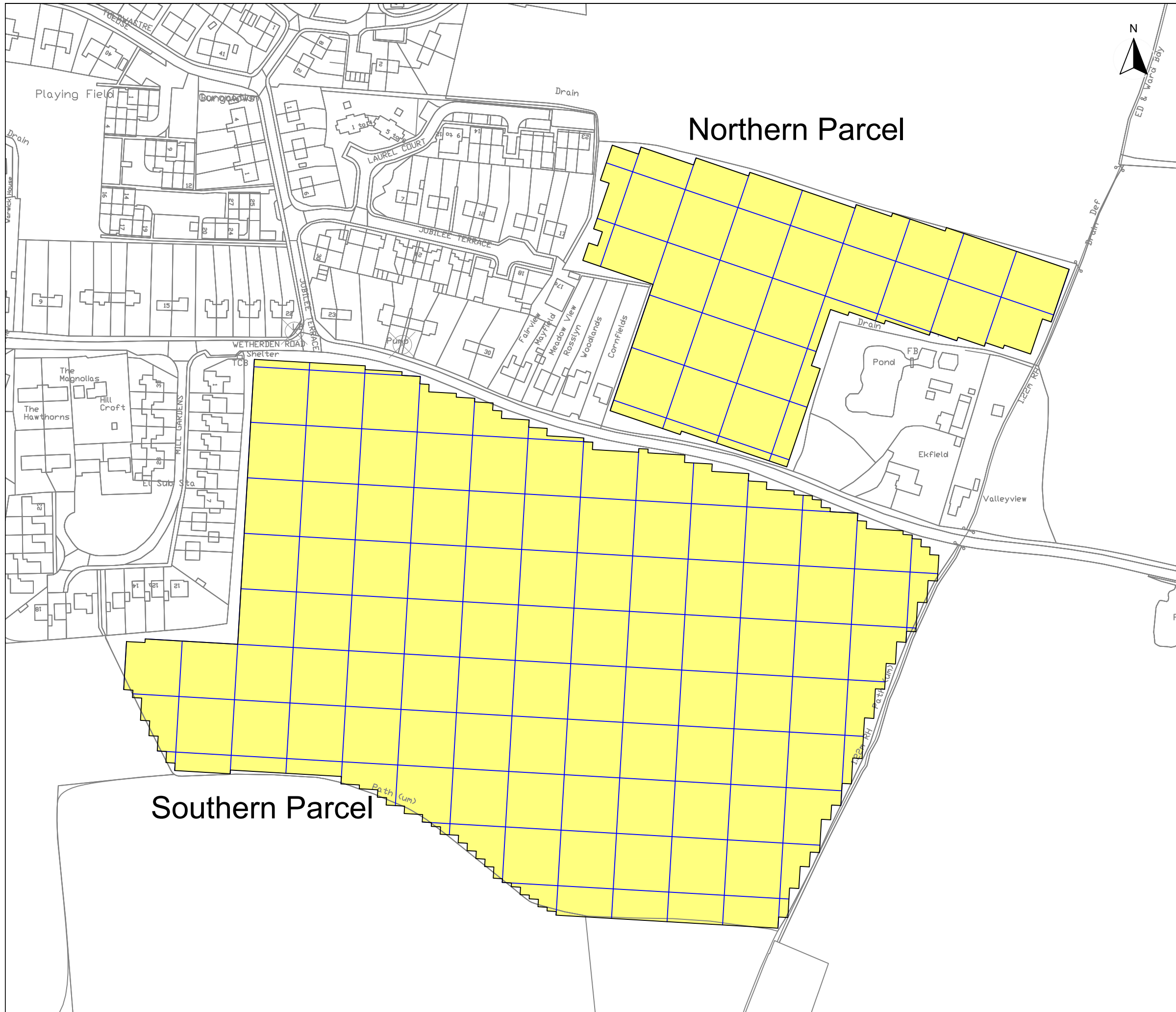

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1:50000 @ A4

Fig No: 1

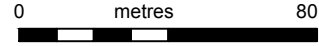


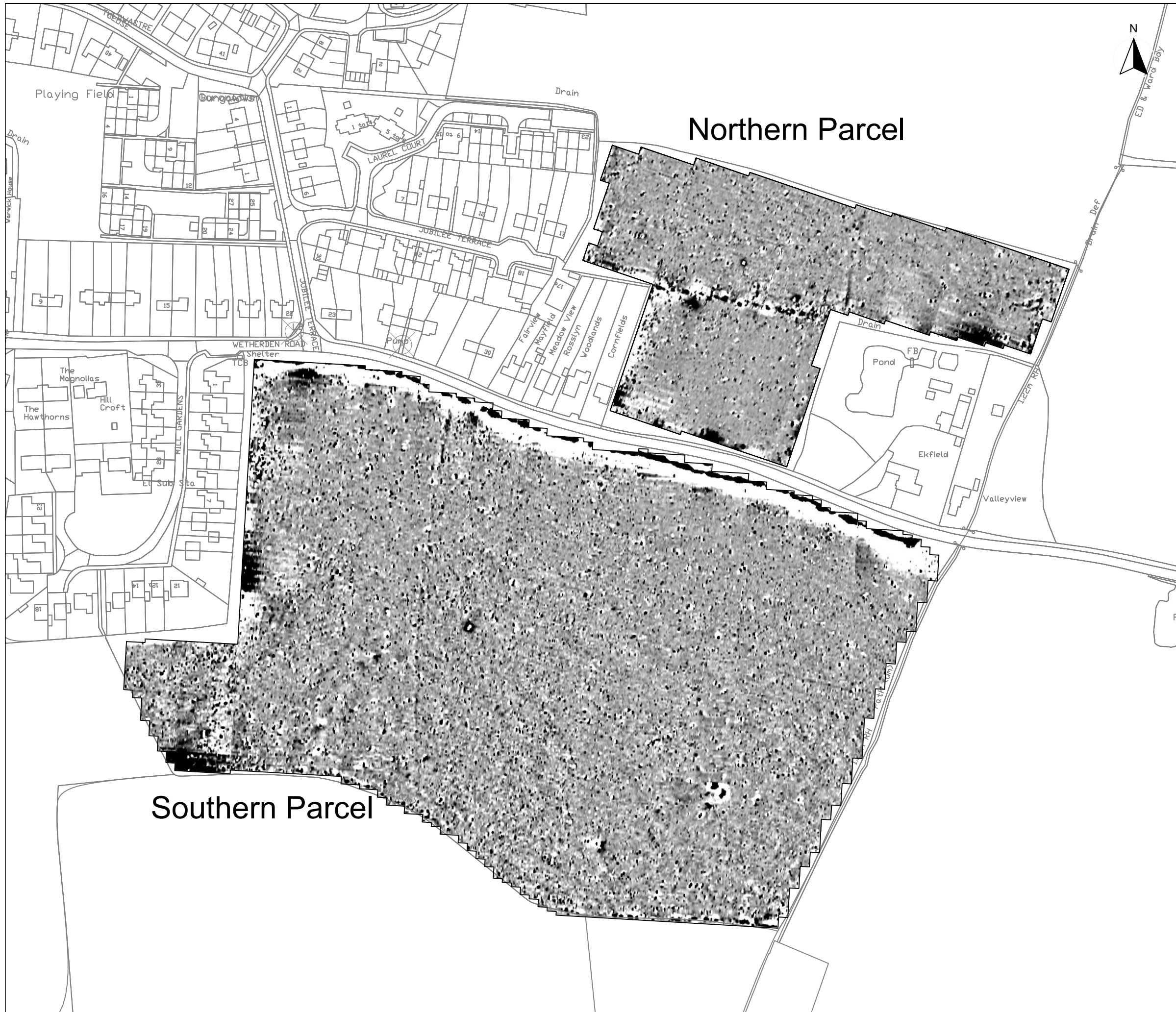
 Magnetometer Survey Area Showing 30m Grids

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Title:	Location of Survey Areas	
Client:	Pegasus Planning Group	
Project:	G1673B Land adjacent to Wetherden Road, Elmswell, Suffolk	
Scale:	 0 metres 80 1:2000 @ A3	Fig No: 2



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sumo
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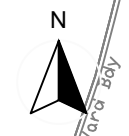
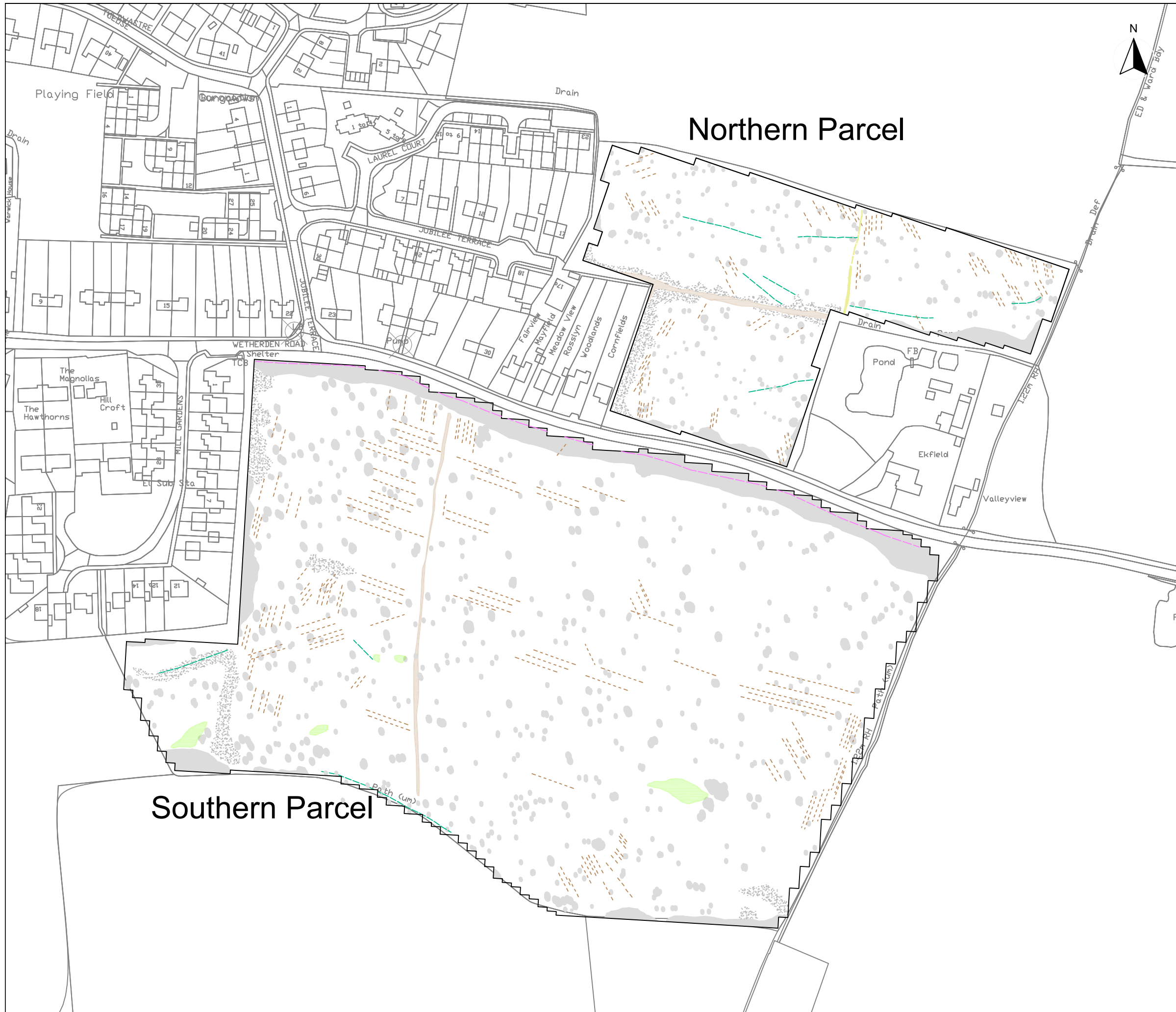
Title: Magnetometer Survey
Greyscale Plots









Client: Pegasus Planning Group

Project: G1673B Land adjacent to
Wetherden Road, Elmswell, Suffolk

Scale: 0 metres 80
1:2000 @ A3

Fig No: 3

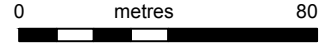


-  Former Field Boundary (Mapped)
-  Former Field Boundary - Conjectural (Discrete Anomaly / Trend)
-  Uncertain Origin - Trend
-  Natural
-  Pipe
-  Ploughing
-  Magnetic Disturbance
-  Ferrous

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Title:	Magnetometer Survey Interpretation	
Client:	Pegasus Planning Group	
Project:	G1673B Land adjacent to Wetherden Road, Elmswell, Suffolk	
Scale:	 0 metres 80 1:2000 @ A3	Fig No: 4

Appendix A - Technical Information: Magnetometer Survey Method

Grid Positioning

For hand held gradiometers the location of the survey grids has been plotted together with the referencing information. Grids were set out using a Trimble R8 Real Time Kinematic (RTK) VRS Now GNSS GPS system.

For CARTEASY^N collected data each data point had its position recorded using a Trimble R10 Real Time Kinematic (RTK) VRS Now GNSS GPS system. The geophysical survey area is georeferenced relative to the Ordnance Survey National Grid.

An RTK GPS (Real-time Kinematic Global Positioning System) can locate a point on the ground to a far greater accuracy than a standard GPS unit. A standard GPS suffers from errors created by satellite orbit errors, clock errors and atmospheric interference, resulting in an accuracy of 5m-10m. An RTK system uses a single base station receiver and a number of mobile units. The base station re-broadcasts the phase of the carrier it measured, and the mobile units compare their own phase measurements with those they received from the base station. This results in an accuracy of around 0.01m.

Technique	Instrument	Traverse Interval	Sample Interval
Magnetometer	Bartington Grad 601-2	1m	0.25m
Magnetometer	CartEasy ^N cart system (Bartington Grad 601 sensors)	0.75m	0.125m

Instrumentation: Bartington Grad601-2 / GSB CARTEASY^N Cart system

Both the Bartington and CARTEASY^N instruments operate in a gradiometer configuration which comprises fluxgate sensors mounted vertically, set 1.0m apart. The fluxgate gradiometer suppresses any diurnal or regional effects. The instruments are carried, or cart mounted, with the bottom sensor approximately 0.1-0.3m from the ground surface. At each survey station, the difference in the magnetic field between the two fluxgates is measured in nanoTesla (nT). The sensitivity of the instrument can be adjusted; for most archaeological surveys the most sensitive range (0.1nT) is used. Generally, features up to 1m deep may be detected by this method, though strongly magnetic objects may be visible at greater depths. The Bartington instrument can collect two lines of data per traverse with gradiometer units mounted laterally with a separation of 1.0m. The CARTEASY^N system has four gradiometer units mounted at 0.75m intervals across its frame – rather than working in grids, the cart uses an on-board survey grade GNSS for positioning. The cart system allows for the collection of topographic data in addition to the magnetic field measurements.

The readings are logged consecutively into the data logger which in turn is daily down-loaded into a portable computer whilst on site. At the end of each site survey, data is transferred to the office for processing and presentation.

Data Processing

Zero Mean Traverse	This process sets the background mean of each traverse within each grid to zero. The operation removes striping effects and edge discontinuities over the whole of the data set.
Step Correction (Destagger)	When gradiometer data are collected in 'zig-zag' fashion, stepping errors can sometimes arise. These occur because of a slight difference in the speed of walking on the forward and reverse traverses. The result is a staggered effect in the data, which is particularly noticeable on linear anomalies. This process corrects these errors.
Interpolation	When geophysical data are presented as a greyscale, each data point is represented as a small square. The resulting plot can sometimes have a 'blocky' appearance. The interpolation process calculates and inserts additional values between existing data points. The process can be carried out with points along a traverse (the x axis) and/or between traverses (the y axis) and results in a smoother greyscale image.

Display

XY Trace Plot	This involves a line representation of the data. Each successive row of data is equally incremented in the Y axis, to produce a stacked profile effect. This display may incorporate a hidden-line removal algorithm, which blocks out lines behind the major peaks and can aid interpretation. The advantages of this type of display are that it allows the full range of the data to be viewed and shows the shape of the individual anomalies. The display may also be changed by altering the horizontal viewing angle and the angle above the plane.
Greyscale Plot	This format divides a given range of readings into a set number of classes. Each class is represented by a specific shade of grey, the intensity increasing with value. All values above the given range are allocated the same shade (maximum intensity); similarly all values below the given range are represented by the minimum intensity shade.

Interpretation Categories

In certain circumstances (usually when there is corroborative evidence from desk based or excavation data) very specific interpretations can be assigned to magnetic anomalies (for example, *Roman Road, Wall, etc.*) and where appropriate, such interpretations will be applied. The list below outlines the generic categories commonly used in the interpretation of the results.

<i>Probable Archaeology</i>	This term is used when the form, nature and pattern of the response are clearly or very probably archaeological and /or if corroborative evidence is available. These anomalies, whilst considered anthropogenic, could be of any age.
<i>Possible Archaeology</i>	These anomalies exhibit either weak signal strength and / or poor definition, or form incomplete archaeological patterns, thereby reducing the level of confidence in the interpretation. Although the archaeological interpretation is favoured, they may be the result of variable soil depth, plough damage or even aliasing as a result of data collection orientation.
<i>Industrial / Burnt-Fired</i>	Strong magnetic anomalies that, due to their shape and form or the context in which they are found, suggest the presence of kilns, ovens, corn dryers, metal-working areas or hearths. It should be noted that in many instances modern ferrous material can produce similar magnetic anomalies.
<i>Former Field Boundary (probable & possible)</i>	Anomalies that correspond to former boundaries indicated on historic mapping, or which are clearly a continuation of existing land divisions. Possible denotes less confidence where the anomaly may not be shown on historic mapping but nevertheless the anomaly displays all the characteristics of a field boundary.
<i>Ridge & Furrow</i>	Parallel linear anomalies whose broad spacing suggests ridge and furrow cultivation. In some cases the response may be the result of more recent agricultural activity.
<i>Agriculture (ploughing)</i>	Parallel linear anomalies or trends with a narrower spacing, sometimes aligned with existing boundaries, indicating more recent cultivation regimes.
<i>Land Drain</i>	Weakly magnetic linear anomalies, quite often appearing in series forming parallel and herringbone patterns. Smaller drains will often lead and empty into larger diameter pipes and which in turn usually lead to local streams and ponds. These are indicative of clay fired land drains.
<i>Natural</i>	These responses form clear patterns in geographical zones where natural variations are known to produce significant magnetic distortions.
<i>Magnetic Disturbance</i>	Broad zones of strong dipolar anomalies, commonly found in places where modern ferrous or fired materials (e.g. brick rubble) are present. They are presumed to be modern.
<i>Service</i>	Magnetically strong anomalies usually forming linear features indicative of ferrous pipes/cables. Sometimes other materials (e.g. pvc) cause weaker magnetic responses and can be identified from their uniform linearity crossing large expanses.
<i>Ferrous</i>	This type of response is associated with ferrous material and may result from small items in the topsoil, larger buried objects such as pipes, or above ground features such as fence lines or pylons. Ferrous responses are usually regarded as modern. Individual burnt stones, fired bricks or igneous rocks can produce responses similar to ferrous material.
<i>Uncertain Origin</i>	Anomalies which stand out from the background magnetic variation, yet whose form and lack of patterning gives little clue as to their origin. Often the characteristics and distribution of the responses straddle the categories of <i>Possible Archaeology</i> and <i>Possible Natural</i> or (in the case of linear responses) <i>Possible Archaeology</i> and <i>Possible Agriculture</i> ; occasionally they are simply of an unusual form.

Where appropriate some anomalies will be further classified according to their form (positive or negative) and relative strength and coherence (trend: weak and poorly defined).

Appendix B - Technical Information: Magnetic Theory

Detailed magnetic survey can be used to effectively define areas of past human activity by mapping spatial variation and contrast in the magnetic properties of soil, subsoil and bedrock. Although the changes in the magnetic field resulting from differing features in the soil are usually weak, changes as small as 0.2 nanoTeslas (nT) in an overall field strength of 48,000nT, can be accurately detected.

Weakly magnetic iron minerals are always present within the soil and areas of enhancement relate to increases in *magnetic susceptibility* and permanently magnetised *thermoremanent* material.

Magnetic susceptibility relates to the induced magnetism of a material when in the presence of a magnetic field. This magnetism can be considered as effectively permanent as it exists within the Earth's magnetic field. Magnetic susceptibility can become enhanced due to burning and complex biological or fermentation processes.

Thermoremanence is a permanent magnetism acquired by iron minerals that, after heating to a specific temperature known as the Curie Point, are effectively demagnetised followed by re-magnetisation by the Earth's magnetic field on cooling. Thermoremanent archaeological features can include hearths and kilns and material such as brick and tile may be magnetised through the same process.

Silting and deliberate infilling of ditches and pits with magnetically enhanced soil creates a relative contrast against the much lower levels of magnetism within the subsoil into which the feature is cut. Systematic mapping of magnetic anomalies will produce linear and discrete areas of enhancement allowing assessment and characterisation of subsurface features. Material such as subsoil and non-magnetic bedrock used to create former earthworks and walls may be mapped as areas of lower enhancement compared to surrounding soils.

Magnetic survey is carried out using a fluxgate gradiometer which is a passive instrument consisting of two sensors mounted vertically 1m apart. The instrument is carried about 30cm above the ground surface and the top sensor measures the Earth's magnetic field whilst the lower sensor measures the same field but is also more affected by any localised buried field. The difference between the two sensors will relate to the strength of a magnetic field created by a buried feature, if no field is present the difference will be close to zero as the magnetic field measured by both sensors will be the same.

Factors affecting the magnetic survey may include soil type, local geology, previous human activity, disturbance from modern services etc.



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Geophysical Survey: Written Scheme of Investigation

G1673 Elmswell, Suffolk

02/08/2016

Contents

- 1.0 Introduction**
- 2.0 Scope of Works**
- 3.0 Method**
- 4.0 Reporting**
- 5.0 Programme**
- 6.0 Resourcing**
- 7.0 Equipment**
- 8.0 Supervision**
- 9.0 Environmental**
- 10.0 Insurance**
- 11.0 Archiving**
- 12.0 Health and Safety**

Risk Assessment

Figure 1 Site Location Diagram

Figure 2 Location of Survey Areas

1.0 Introduction

This document has been produced to describe the Archaeological Geophysical Survey required at Elmswell, Suffolk. The survey is on three sites: Site 1 (NGR TL 989 635), Site 2 (TL 996 633) and Site 3 (TL 995 631). The sites are located approximately 13km east of Bury St. Edmunds on the eastern edge of Elmswell. Site 1 is bounded to the north by Cross Street, to the west by properties on Warren Lane and the east by properties on Cresmedow Way. Site 2 is bounded to the south by Wetherden Road, and to the west by residential properties on Jubilee Terrace and Laurel Court. Farmland lies to the north and east. Site 3 is south of Wetherden Road, with houses on Mill Gardens to the west and farmland to the east and south.

The results of the survey will be presented in two separate reports: one for Site 1 and another for Site 2 and Site 3

OASIS Reference Numbers Suffolk CC HER Parish Codes and HER Event Numbers have been obtained, as follows:

Site 1: OASIS Ref. gsbprosp1-258977. HER Parish Code EWL 036. HER Event Number ESF24388

Site 2 and Site 3: OASIS Ref. gsbprosp1-259004. HER Parish Code EWL 037. HER Event Number ESF24389.

The underlying geology within the survey area consists of Crag Group – sand with superficial deposits of Head - clay, silt, sand and gravel (Croxtan sand and gravel in the south of Site 3 (BGS 2016).

Soils are Ashley (572q) association fine loamy over clayey soils with slowly permeable subsoils and slight seasonal waterlogging, associated with similar but wetter soils. Some calcareous and non-calcareous slowly permeable clayey soils. In the south of Site 3, soils are Newport 3 (551f) association deep well drained sandy and coarse loamy soil: some coarse and fine loamy soils with slowly permeable subsoils and slight seasonal waterlogging. Risk of wind erosion (SSEW 1983).

2.0 Scope of Works and Archaeological Background

The geophysical survey forms part of a wider archaeological assessment being carried out by Pegasus Planning Group on behalf of Endurance Estates Strategic Land Ltd. The work will be carried out with the following objective: to confirm the presence or absence of remains of archaeological potential not previously recorded.

No archaeological remains are known within the survey areas. Prehistoric artefact scatters are recorded in several locations within 1km of the sites, and a large pit or ditch terminal c.700m to the north-west contained a cremation burial and artefacts dated to the Late Bronze Age. A number of pits, ditches and post-holes at Lawn Farm Quarry (c.300m to the south) contained Iron Age ceramics and burnt flint. A possible Roman road runs approximately north-south adjacent to Sites 2 and 3, and Romano-British artefact scatters have been found in the general area. Ditches of the period have been identified approximately 800m to the north may be part of a field system. A field system was identified c.400m north of Site 1 and may be of medieval or Romano-British date, possibly including an enclosure. The Franchise Bank is shown on 16th century mapping and is likely to be medieval or earlier in origin; it joins the possible Roman road and abuts the eastern boundaries of Sites 2 and 3. Historic mapping indicated that the sites have been in agricultural use, with field divisions no longer extant (Pegasus 2016a and b).

3.0 Method

Although remains from any period may exist within the site, the periods most likely to be represented are Late Prehistoric and the Romano-British: medieval activity may also be identified and former field boundaries are likely to be detected. Also taking into consideration the size of the survey area and the geology, magnetometer survey has been selected as the most suitable technique

3.1 Detailed Recorded Survey - Grid Establishment / Relocation Data

All recorded survey data are collected with reference to a site survey grid or survey baselines. For hand-held instruments (gradiometer survey) this grid consists of individual 20mx20m or 30mx30m squares.

The survey grid is marked out by means of red plastic tent-pegs or brightly coloured/flagged canes and grid nodes are set out with a positional accuracy of at least 10cm (0.1m) as per HE guidelines.

As standard the survey grid will be established using Real Time Kinematic (RTK) differential GPS equipment. On rare occasions where this is not practical, a combination of Total Station, optical square, ranging rods and tape measures may be used.

Data are collected along regularly spaced traverses within the grid. These traverses are marked by "intermediate" plastic pegs or canes, set out using tape measures.

Either at this stage, or after data collection is complete, measurements will be taken which allow the re-location of the survey area. This is necessary for the production of maps in the report and for any subsequent re-establishment of the survey grid by other workers. Tie-in measurements are made to clear features (such as boundaries and buildings) *which appear on the mapping*.

If required, markers (pegs, canes, stakes or fluorescent spray-paint) can be left *in situ* at boundaries to mark grid baselines and assist in the subsequent re-establishment of the grid. The client should advise of any special arrangements/preferences in advance of survey.

On completion of the survey (i.e. when all data have been collected, downloaded to computer, visually examined, and backed up to an external device) all pegs/canes and any other temporary markers will be removed from the evaluation area, with the exception of any baseline markers specifically requested by the client (see above).

3.2 Detailed Recorded Survey - Data Collection: Gradiometer Survey

<i>Standard Instrument:</i>	Bartington Grad 601-2
<i>Standard sample interval (along traverse):</i>	0.25m
<i>Standard traverse interval:</i>	1.00m

Total data points: 1600 readings per 20m x 20m grid square (3600 per 30m x 30m).

Data are stored within the instrument's memory.

For optimum data quality, it is imperative that the operator is able to walk at an even pace whilst holding the instrument steady. It is for this reason that the survey area needs to be free of obstructions such as dense vegetation.

Data are typically displayed as greyscale or colourscale images (where a given palette is applied to a defined range of data values) or XY trace plots (where each traverse is plotted as a continuous line with data values represented by a vertical offset from the centreline).

4.0 Reporting

4.1 General Data Handling

All data files (survey data and grid tie-in data) are transferred to the GSB server immediately upon returning to the office. Nightly off-site backups are made of all project work in progress. On completion of a project the entire archive is written to two CDs and an external hard disk drive, held at separate off-site locations. As described above, all data is stored remotely via cloud computing when using a cart system.

4.2 Data Processing and Analysis

The interpretation is based on a variety of plotting formats and a range of data displays; it is undertaken by the Project Co-ordinator. Wherever possible, account is taken of the nature of the prevailing archaeological, pedological, geological, and land use conditions. These interpretations are independently checked by either the Senior Geophysicist or the Director.

In-house templates and guidelines and standard reference texts (e.g. English Heritage Thesaurus of Monument Types) are used to assist in the analysis of results.

The data will be interpreted and presented at suitable scales and located on *Ordnance Survey* base maps as appropriate, and will include location plans, greyscale plots and interpretation diagrams.

The survey methodology, report and any recommendations will comply with guidelines outlined by Historic England (then English Heritage) (EH 2008) and by the Chartered Institute for Archaeologists (previously Institute of Field Archaeologists) (IfA 2002), and *Standard and Guidance for Archaeological Geophysical Survey* (ClfA 2013). All figures reproduced from Ordnance Survey mapping are with the permission of the controller of Her Majesty's Stationery Office Crown copyright Licence No. 100018665.

4.3 Project Report

The results of the survey will be presented in two separate reports: one for Site 1 and another for Site 2 (Phase 1) and Site 3.

Each standard GSB project report will be printed and bound and will contain the following sections: report text; list of figures; report figures; appendix detailing technical information. A CD is affixed to the inside front cover of the report. This will contain a pdf version of the printed report and additional reference plots of minimally processed data and XY Trace Plots in CAD format. Depending on the client's specifications, AutoCAD (dwg or dxf) versions of the report figures may also be included.

The report text will:

Describe the site and situation of a survey area and the prevailing local topography, land use, soils and geology.

Provide a brief description of any known archaeological remains in the vicinity, and their relevance to the survey results, will be made as necessary.

List and explain the display formats adopted.

Describe any general factors or complications which must be considered when viewing the data. These include any local factors which may hinder the collection or interpretation of the results.

Assess the results in accordance with the aims of the survey. In the majority of cases, the anomalies are interpreted from the perspective of their archaeological potential.

Provide the names of the project co-ordinator and all project assistants together with the dates of the survey and report.

All reports are proof read by at least two other qualified members of staff to ensure: completeness and quality of data interpretation, clarity and accuracy of expression, consistency of format; good spelling and grammar; that references to figures and tables are complete, and that any external references are as full as possible.

- The report figures will present the results of the survey accurately positioned on the site mapping. They are produced in AutoCAD and will include:

- A diagram showing the location of the survey areas (with key, scale and north arrow).
- Greyscale or colour plot(s) of the data-set(s) (with plotting levels, scale and north arrow).
- Digitised interpretation(s) of the results (with key, scale and north arrow).

The scale of the above printed figures will vary depending on survey size but the scale of the data plots and interpretations will not exceed 1:2500.

The report will include the OASIS reference number and the Suffolk HER event reference number obtained before survey commencement (see 3.0 above). A copy of the online OASIS record will be included as an appendix to the report, together with a copy of the approved WSI.

The reference data plots on the CD are not positioned on the mapping and are presented in CAD format together with a CAD viewer. These will include at least one XY trace plot and one greyscale image of minimally processed data for each complete survey area/data-set.

The survey methodology, report and any recommendations will comply with guidelines outlined by *English Heritage (Geophysical Survey in Archaeological Field Evaluation, Research and Professional Services Guidelines No 1, compiled by A David, April 2008)*, the (then) *Institute for Archaeologists (The Use of Geophysical Techniques in Archaeological Evaluations, IFA Paper No 6, C Gaffney, J Gater and S Ovenden, 2002)* and *Standard and Guidance for Archaeological Geophysical Survey (ClfA 2014)*.

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5.0 Programme

The geophysical survey will commence on 8 August 2016 (to be confirmed) and will take approximately three days. Our normal working hours will be between 9.00am & 5.30pm.

GSB Projects Co-ordinator will liaise with Rosey Meara (Pegasus Planning Group), regarding the progress of the survey.

6.0 Resourcing

The survey will be carried out by a minimum of two or three suitably experienced surveyors.

7.0 Equipment

Trimble R8 Real Time Kinematic (RTK) VRS Now dGPS equipment / tapes / ranging poles / optical squares / plastic survey pegs.

Bartington Grad 601-2 handheld gradiometers

Laptop and netbook computers

Mobile telephones nos. 07740 110058/059/061 (tbc)

Transport will be by car/van. Vehicles shall be parked in such a way so as to ensure that they do not obstruct any existing accesses, pathways or the highway. The parking of vehicles and all access to fields to be agreed in advance of the survey.

8.0 Supervision

The survey team will report their progress daily to the Projects Co-ordinator or General Manager of GSB Prospection Ltd.

9.0 Environmental

Geophysical survey has little potential to effect the environment; however the following precautions will be taken:

Field gates to be secured & left in the same condition as found.

Litter to be removed from site

Noise to be kept to a minimum.

10.0 Insurance

GSB holds Public Liability Insurance & Employees Liability Insurance to a limit of £10,000,000; Professional Indemnity of £5,000,000. No claims have been made or are pending.

11.0 Archiving

GSB follows normal industry practice and maintains both hard and digital copies of all reports and survey data. All data files (survey data and grid tie-in data) are transferred to the GSB server immediately upon the return of a survey team to the office. Nightly off-site backups are made of all project work in progress. On completion of a project the entire archive is written to two CDs and held at separate off-site locations: all data is automatically backed-up nightly to a remote facility. All GSB reports include a "Digital Report CD" containing all report documents in both PDF and their native formats, and the reference plots in CAD format together with a CAD viewer. Copies of survey reports will be issued to the respective Local Authority Planning Archaeologist / HER by the client, together with all relevant archaeological documents, at the appropriate stage.

GSB has advised ADS regarding geophysical archiving. GSB are committed to long-term storage of data and reports and are working towards full implementation of the '*ADS Guide to Good Practice*' (Schmidt, 2001). Our document will be updated when full implementation is achieved.

12.0 Health & Safety

High Visibility vests & clothing/footwear appropriate for the specialist nature of a magnetic survey will be worn at all times. ***It should be noted that we no metal objects whatsoever can be carried or worn as these affect the instruments used on survey.***

All GSB field personnel hold current CSCS Health & Safety Passports Several staff members are qualified First Aid representatives and at least one will be a member of the survey team for this project.

A Risk Assessment will be carried out for every project, in addition to the GSB Generic Risk Assessment. The former is in part informed by a Questionnaire sent to the client (or commissioning body) before commencement. It identifies potential hazards & the control measures required to minimize the potential for harm to our personnel. The Risk Assessment will be issued to the survey team and they will be briefed on its contents prior to the start of works. A Dynamic Risk Assessment proforma is provided with the Project Information Sheet, which all team members are required to read and sign their acknowledgment.

Welfare

Surveyors will make use of local amenities as there are no welfare facilities on site. The location of the nearest toilet facilities will be identified in a Project Information Sheet provided to the field team for every project, every week.

Emergency Procedures

In the event of an accident, the Geophysical survey team will follow the procedure established for the site. Any accident or near miss is to be reported as soon as possible to the Director or Office Manager, GSB Prospection Ltd. Details will be entered in GSB's Accident Book.

Several staff members are qualified First Aid representatives and at least one will be a member of the survey team for this project. A first aid kit will be carried in the vehicles & made available at all times whilst out on survey in the event of a minor injury.

The nearest accident and emergency department will be identified in a Project Information Sheet provide to the field team for every project, every week.

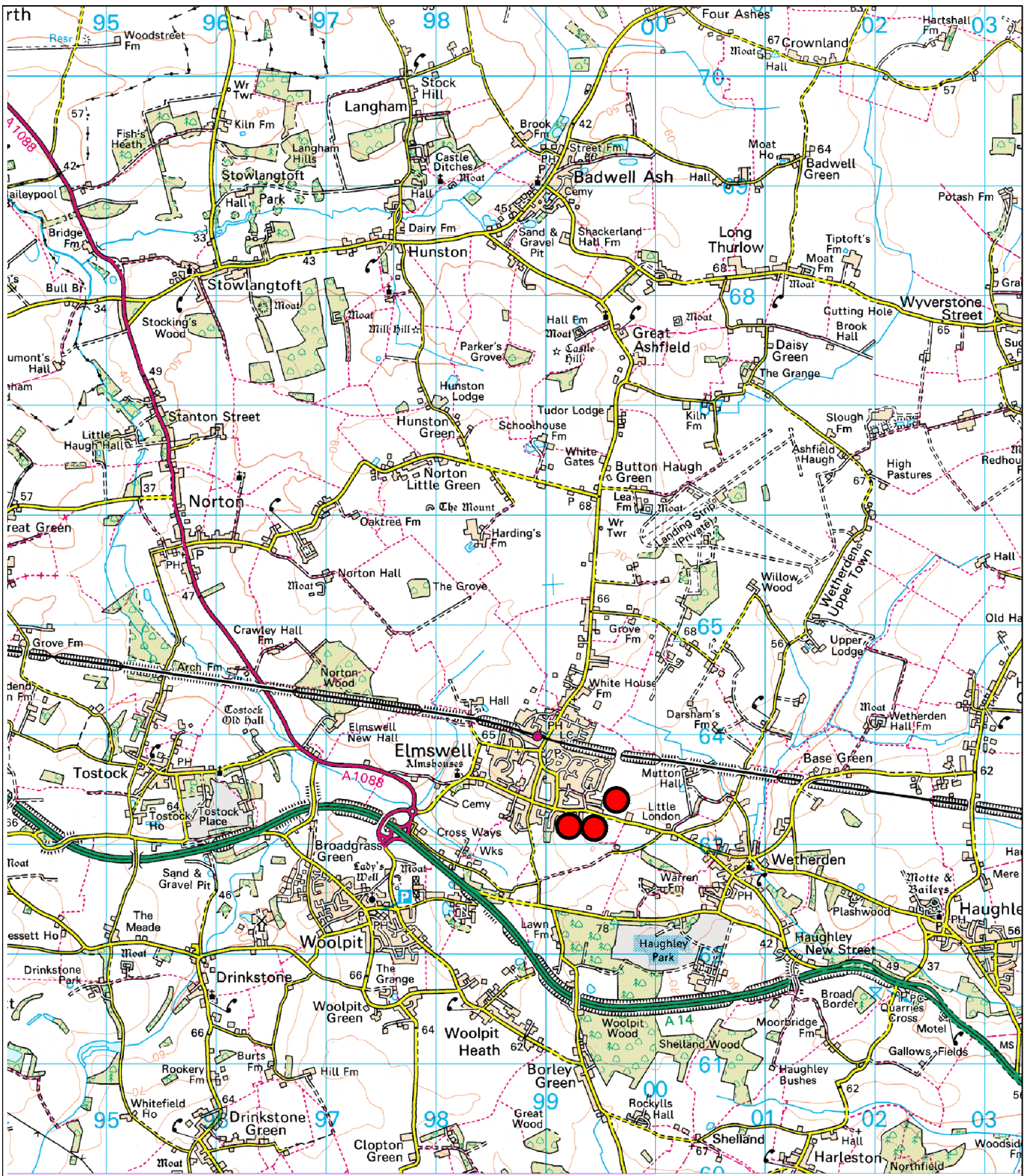
References

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(<http://www.bgs.ac.uk/opengeoscience/home.html?Accordion1=1#maps>)
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- Pegasus 2016a *Heritage Statement: land at Elmswell, Suffolk. Land to the East of Warren Lane*. Draft unpublished report, Pegasus Planning Group. Cirencester.
- Pegasus 2016b *Heritage Statement: land at Elmswell, Suffolk. Land Adjoining Wetherden Road*. Draft unpublished report, Pegasus Planning Group. Cirencester.
- Schmidt.2001 *Geophysical Data in Archaeology: A Guide to Good Practice*, Archaeology Data Service
- SSEW 1983 *Soils of England and Wales. Sheet 4, Eastern England*. Soil Survey of England and Wales, Harpenden.

FIELDWORK RISK ASSESSMENT

Project Name: Elmswell, Suffolk				Project No: G1673				
Dates of survey: 8-10 August 2016		Date of Assessment: 28/07/16						
<p>Level of Risk is determined by use of the calculator on the right. Risk = Likelihood multiplied by Severity</p>		<p>Likelihood 0= zero to very low 1 = very unlikely 2 = unlikely 3 = likely 4 = very likely 5 = almost certain</p>		<p>Severity 0 = no injury or illness 1 = First Aid injury or illness 2 = minor injury or illness 3 = illness or injury resulting in 3 or more days absence from work 4 = major injury or illness 5 = fatality, disabling injury etc.</p>				
Hazards	Without control measures			With control measures				
	Possible Effect	L	S	R	Control Measures	L	S	R
Working in remote locations	Unobserved injuries or difficulties. Lack of access for emergency services. Delay in treatment of minor or moderate injuries.	2	5	10	Ensure all staff aware of location details e.g. NGR, access routes. Keep mobile phones to hand. Ascertain nearest A&E dept. All staff to stay within visual proximity of other members of the team.	0	5	0
Working in remote locations	Lack of washing facilities, hot water.	5	3	15	See 'contaminated land' below. Use portable water supply and soap. If not pos, use hand wash	0	3	0
Travel in vehicles	Collision/accident	2	5	10	Ensure vehicle serviced and maintained. Check tyre pressures, oil and water levels. Rotate driver/ensure adequate rest periods. Wear seatbelts. Do not overload vehicle or obstruct driver's view.	0	5	0
Exiting vehicles parked roadside	Severe injury/fatality from collision with passing vehicles	3	5	15	Selecting parking places carefully, park off road, avoid roadside if pos. Look carefully before opening doors. Wear high vis clothing. Use look-outs in unavoidable situations.	0	5	0
Lone working	Unobserved injury or difficulties	2	5	10	Avoid: try to work within sight of another person. If unavoidable, wear high vis clothing and carry mobile phone, set time to return.	0	5	0
Access to survey areas	Injury, tetanus infection from barbed wire fence, trauma injuries jumping ditches etc.	3	3	9	Ascertain access prior to survey. Only use proper access routes, gates etc.	0	3	0
Lightning strike	Severe injury/fatality	1	5	5	Get into vehicle if pos, crouch down if not. Do not work in thunderous conditions.	0	5	0
Wet and cold weather	Hypothermia	3	5	15	Appropriate clothing: layers, waterproofs, hat. Take spare dry clothing. Use weather forecast	0	5	0
Hot weather	Sunburn, dehydration	4	3	12	Appropriate clothing; cover bare skin, wide brimmed hat. Use sun cream. Ensure sufficient water available. Use weather forecast	0	3	0
Survey, grid setting out.	Trip hazards – pegs, tapes, ropes. Impaling injuries on pegs.	2	4	8	Use high-vis plastic pegs. Minimise point-up use, remove if public present. Remove as soon as possible.	0	4	0

Agricultural equipment	Collision or accident with machinery	2	5	10	Liaise with farmer/landowner. Do not work in fields where machinery is in use. Stay clear of machinery.	0	5	0
Farm animals	Kicking, biting, goring	1	4	4	Liaise with farmer/landowner. Ensure livestock removed from fields. Do not work in fields with large animals present.	0	4	0
Rivers, streams, ponds	Drowning, Weil's disease	2	5	10	Ascertain presence of rivers, streams and ponds and avoid.	0	5	0
Insects	Lyme's disease	2	4	8	Wear long sleeved garments. Long trousers tucked in. Be aware of symptoms.	0	4	0
Insects	Stings, bites, allergies	3	3	9	Clothing – as above. Record details of any persons with allergies. Ensure anti-histamine and bite cream available.	0	3	0
Animal burrows	Trip hazard	3	3	9	Take great care when walking. Mark known or observed holes.	0	3	0
Slipping	Slip hazard	2	1	2	Wear appropriate footwear. Avoid steep or muddy slopes, especially wet grass.	0	1	0
Deep Ploughed / Freshly ploughed ground	Tripping, ankle and leg injuries	3	3	9	Assess ground conditions before survey. Do not work in unsuitable conditions. (Freshly ploughed & deep ploughed ground is unsuitable for survey because the operator has to hold the instruments vertically whilst walking at a steady/regular pace & observing the instruments LCD. This cannot be achieved if there is a trip hazard or risk of turning an ankle on "rutted" ground.	0	3	0
Uneven ground	Tripping, ankle and leg injuries	3	3	9	Assess ground conditions before survey. Do not work in unsuitable conditions. Set instruments to speed appropriate for conditions	0	3	0
Contaminated land	Inhalation or ingestion of harmful substances. Poisoning, allergies, skin complaints from fertilizers, insecticides etc.	3	5	15	Liaise with farmer/landowner. Do not work in or adjacent to fields where fertilizers or insecticides are in use or have recently been used.	0	5	0
Contaminated land	Poisoning, allergies, skin complaints from industrial or other contaminants	2	5	10	Obtain assurances before survey. Stop work immediately upon suspicion of contamination	0	5	0
Contaminated land	Wild, farm or domestic animals (dogs etc.) urine and faeces	2	4	8	Wear gloves, maintain observation. Wash hands before eating, do not touch face when working	0	4	0
Overhanging branches	Cuts, impaling	1	3	3	Do not survey below low trees and bushes	0	3	0
Overhanging power cables	Electrocution	2	5	10	Asses site for presence of power cables. Do not carry long equipment (staff, ranging rods etc.) or zero mag sus coils in vicinity of overhead cables.	0	5	0
Plants, vegetation	Stinging, poisoning, allergies	2	3	6	Avoid any unrecognised plants. Wear gloves and long sleeved garments, long trousers.	0	3	0
Carrying heavy equipment	Back injury etc.	2	3	6	Follow standard procedures	0	3	0
Magnetometer survey	Back strain, repetitive strain injury	3	3	9	Ensure harness comfortable. Wear gloves if hand strain experienced. Cease survey if back pain experienced.	0	3	0



 Site Location



Title:
Site Location Diagram

Client:
Pegasus Planing Group

Project:
G1673 Elmswell, Suffolk

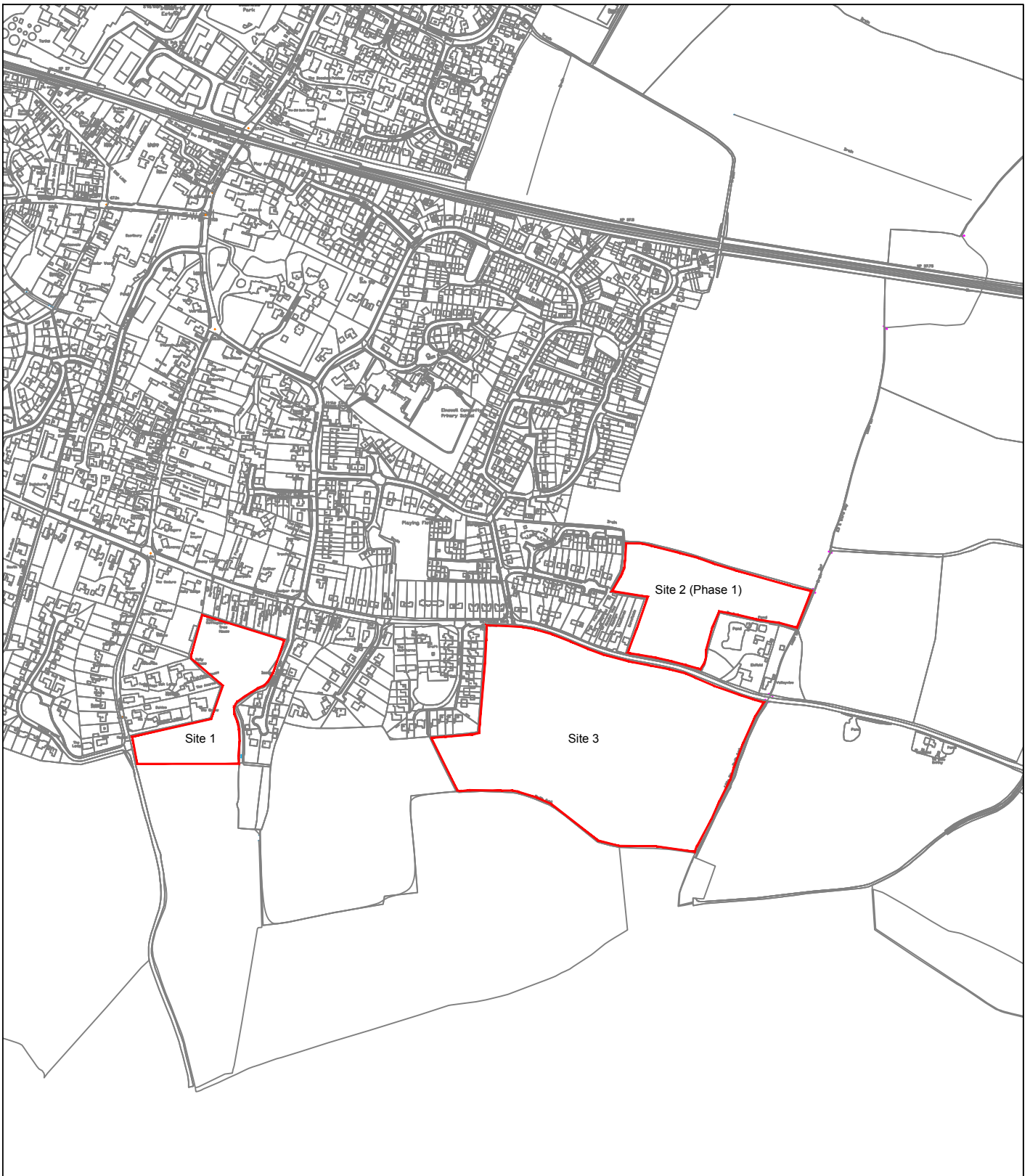
GSB
PROSPECTION Ltd



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FAX: 01274 830 212
www.gsbprospection.com

Scale: 0 metres 2000
1:50000 @ A4

Fig No:
1



Magnetometer Survey Areas



Title:
Location of Survey Areas

Client:
Pegasus Planning Group

Project:
G1673 Elmswell, Suffolk

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PROSPECTION Ltd



GSB Prospection Ltd
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Scale: 0 metres 300
1:7500 @ A4

Fig No:
2

OASIS DATA COLLECTION FORM: England

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Printable version

OASIS ID: gsbprosp1-259004

Project details

Project name	Land adjacent to Wetherden Road, Elmswell, Suffolk
Short description of the project	Geophysical (magnetometer) survey of land north and south of Wetherden Road. Elmswell. No anomalies of archaeological interest were detected. Three former field boundaries were identified, two of which appear on First Edition OS mapping.
Project dates	Start: 09-08-2016 End: 10-08-2016
Previous/future work	Not known / Not known
Any associated project reference codes	G1673B - Contracting Unit No.
Any associated project reference codes	ESF24389 - HER event no.
Type of project	Field evaluation
Monument type	NOT KNOWN Uncertain
Monument type	NOT KNOWN Uncertain
Significant Finds	NOT KNOWN Uncertain
Significant Finds	NOT KNOWN Uncertain
Development type	Housing estate
Prompt	Planning condition
Position in the planning process	Not known / Not recorded
Solid geology	Unknown
Solid geology (other)	Crag group - sand.
Drift geology	SAND AND GRAVEL OF UNCERTAIN AGE OR ORIGIN
Drift geology (other)	Head - clay, silt, sand and gravel, Croxton sand and gravel in the south of Site 3.
Techniques	Magnetometry

Project location

Country	England
Site location	SUFFOLK MID SUFFOLK ELMSWELL Land adjacent to Wetherden Road. Elmswell, Suffolk
Postcode	IP30 9DG

Study area 11.6 Hectares
 Site coordinates TL 996 633 52.231172975464 0.923161824573 52 13 52 N 000 55 23 E Point
 Site coordinates TL 995 631 52.229413468986 0.921581378679 52 13 45 N 000 55 17 E Point

Project creators

Name of Organisation GSB Prospection Ltd
 Project brief originator Consultant
 Project design originator GSB Prospection Ltd
 Project director/manager GSB Prospection Ltd
 Project supervisor GSB Prospection Ltd
 Type of sponsor/funding body Developer
 Name of sponsor/funding body Endurance Estates Strategic Land Ltd

Project archives

Physical Archive Exists? No
 Digital Archive recipient Pegasus Planning Group
 Digital Contents "Survey"
 Digital Media available "Geophysics"
 Paper Archive recipient Pegasus Planning Group
 Paper Contents "Survey"
 Paper Media available "Drawing", "Report", "Survey ", "Unpublished Text"

Entered by GSB Prospection Ltd (info@gsbsumo.com)
 Entered on 7 September 2016

OASIS:

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